SUPPLEMENT.

The Mining Journal,

RAILWAY AND COMMERCIAL GAZETTE:

FORMING A COMPLETE RECORD OF THE PROCEEDINGS OF ALL PUBLIC COMPANIES.

No. 1119.—Vol. XXVII.] LONDON, SATURDAY, JANUARY 31, 1857. [WITH JOURNAL] Stamped ....Sixpence. Unstamped..Fivepence.

STATISTICS OF THE MINING INTEREST.

BY WILLIAM HENRY CUELL, ESQ.

TABULAR STATEMENTS, WITH RETURNS OF METAL, ON DIVIDEND-PAYING MINES, FOR THE PAST YEAR (1856).

CORNISH AND DEVONSHIRE MINES.

No. of Shares	Amount Paid.	Name of Mine.	Market Price.	Dividend per share.	Total Amount	Metal.	Parish.	Purser or Sec.	Address.	System.	Dividend payable.	Copper.	Tin.	Lead.	Total Amount of Money.	Lease granted.	Dues.
	£ s. d.		£.	£ s. d.	£.							Tons.	Tons.	Tons.	£. s. d.	In Years.	
5120	2 11 10	Alfred Consols	21⅛	1 14 0	8704	Copper	Hayle	H. Noell	Phillack	Cost-book	Two months	3559	—	—	28,606 0 0	1850 21	1-18 & 1-20
4000	2 6 8	Bedford United	7⅛	0 12 6	2500	Copper	Tavistock	G. Kieckhoefer	50, Threadneedle-street	ditto	Three months	2397	—	—	13,653 0 0	1841 21	1-15
200	91 5 0	Botallack	180	29 0 0	5800	Copper	St. Just	S. H. James	Cornwall	ditto	—	651	—	—	8,202 0 0		1-24
240	20 10 0	Boscean	95	12 0 0	2880	Tin	St. Just	S. York	Cornwall	ditto	Two months	—	—	—	—		
256	20 0 0	Condurrow	170	15 0 0	3840	Copper and tin	Camborne	N. Vivian	Cornwall	ditto	—	1918	102	—	19,855 0 0	1845	1-20
2048	4 10 0	Carnyorth	6	0 6 0	614	Tin	St. Just	— Pearce	Penzance	ditto	—	—	—	—	—		
102	1 0 0	Devon Great Consols	440	58 0 0	59392	Copper	Tavistock	A. Allen	Gresham House	Joint-stock	Two months	29425	—	—	143,045 0 0	1844	1-12
171	257 15 0	Dolcoath	210	28 10 0	5101	Copper and tin	Camborne	T. Thomas	Camborne	Cost-book	ditto	605	435	—	35,324 0 0		
671	32 0 0	Ding Dong	30	10 10 0	7056	Tin	Gulval	Bolitho & Co.	Penzance	ditto	Three months	—	—	—	—		
12800	1 19 0	Drake Walls	1¾	0 2 6	1600	Tin and copper	Calstock	H. Williams	Moorgate-street	ditto	—	—	—	—	—		
12	24 5 0	East Pool	325	25 0 0	3200	Tin and copper	Pool	W. Prisk	Illogan	ditto	Two months	2985	48	—	20,372 0 0		
5700	4 15 0	Exmouth and Adams	8	0 18 0	5130	Lead	Christow	J. G. Bidwell	Devonshire	ditto	ditto	—	—	1568	18,655 0 0		1-30
4944	4 0 0	Fowey Consols	5	0 9 0	3705	Copper	Tywardreath	Capt. Davis, R.M.	St. Blazey, Cornwall	ditto	Three months	5307	—	—	35,924 0 0		
111	100 0 0	Great Work	130	32 10 0	3867	Tin	Breage	J. Clarke	Cornwall	ditto	ditto	5	199	—	16,646 0 0		
6099	3 7 6	Hingston Down	7	0 12 0	3600	Copper	Calstock	G. Kieckhoefer	50, Threadneedle-street	ditto	Two months	2304	—	—	14,230 0 0		
150	2 10 0	Levant	120	8 0 0	1280	Copper	St. Just	J. Rowe	Cornwall	ditto	Three months	1634	232	—	24,991 0 0		
5400	3 15 0	Mendip Hills	—	0 5 0	1250	Lead	Blagdon			ditto	—	—	—	—	—		
6000	0 2 0	Nether Hearth	—	0 1 0	320	Lead	North Elswick	J. H. Robinson	Westmorland	ditto	—	—	—	177	2,577 0 0		
6000	nil.	North Wheal Basset	36	4 9 6	26850	Copper	Illogan	J. Pascoe	Threadneedle-street	ditto	Two months	5052	—	—	52,575 0 0		1-15
400	1 2 6	Par Consols	23	3 0 0	19200	Copper and tin	St. Blazey	Capt. Davis, R.M.	St. Blazey	ditto	Three months	4190	306	—	67,777 0 0		
500	7 15 0	Peak United	—	0 10 0	250	Lead				ditto	—	—	—	—	—		
200	100 0 0	Phœnix	400	57 10 0	11500	Copper and tin	Linkinghorne	T. Cross	Cornwall	ditto	Three months	—	—	—	—		
6000	15 0 0	Polberro	—	3 6 0	3295	Tin and copper	St. Agnes	J. Taylor and Sons.	Queen-street-place	ditto	ditto	—	262	—	19,911 0 0		
560	20 13 0	Providence	76	18 0 0	10080	Tin and copper	Uny Lelant	S. Higgs	St. Ive	ditto	ditto	38	256	—	19,733 0 0		
512	12 0 0	Rosewarne	40	13 10 0	6912	Copper	Gwinear	W. Huthnance	Camborne	ditto	Two months	2412	—	—	17,823 0 0		
8000	0 6 0	Sortridge Consols	1⅛	0 7 6	4500	Copper	Whitchurch	— Cohen	Bank Chambers	ditto	Three months	1907	—	—	13,856 0 0		
256	2 10 0	South Caradon	345	48 0 0	12288	Copper	St. Cleer	P. Clymo	Cornwall	ditto	Two months	4694	—	—	46,488 0 0		1-18
9000	1 6 6	South Tamar	⅛	0 10 0	4500	Silver-lead	Beerferris	G. Kieckhoefer	50, Threadneedle-street	ditto	Three months	—	—	666	12,648 0 0		
496	18 18 9	South Frances	350	53 0 0	26288	Copper and tin	Illogan	J. Cady	Cornwall	ditto	Two months	6513	20	—	50,076 0 0	1844 21	1-15
280	23 7 8	Spearne Moor	—	1 5 0	350	Copper	St. Just	R. Pierce	Penzance	ditto	Three months	7	42	—	3,109 0 0	1845 21	1-18
94	80 0 0	St. Ive Consols	100	20 0 0	1880	Tin	St. Ive	J. Millett	Cornwall	ditto	Four months	25	206	—	14,446 0 0	1846 21	1-15
9600	4 10 0	Tamar Consols	1	0 2 6	1200	Silver-lead	Beeralston	W. George	Gresham-street	ditto	—	—	—	—	—		
6000	9 0 0	Tincroft	4	0 15 0	4500	Copper and tin	Pool	H. Williams	Moorgate-street	ditto	Three months	—	—	—	—		
4000	0 12 0	Tretoil	3	0 5 0	1000	Copper and tin	Bodmin	— Rich	Bodmin	ditto	—	—	69	—	4,968 0 0		
4096	2 0 0	Trewetha	3¾	0 12 0	2458	Lead	Menheniot	R. Dunsford	Threadneedle-street	ditto	Three months	—	—	351	8,543 0 0		
400	40 0 0	United	210	2 0 0	800	Copper	Gwennap	Com. of Manage.	Cornwall	ditto	Two months	9395	—	—	50,773 0 0		1-15
6000	1 10 0	West Basset	34½	3 19 6	23850	Copper	Illogan	J. Pascoe	Threadneedle-street	ditto	ditto	7673	—	—	50,013 0 0		
256	10 7 0	West Damsel	85	2 0 0	512	Copper	Gwennap	G. W. A. Michell	Cornwall	ditto	ditto	1730	—	—	9,224 0 0		
1024	5 0 0	West Providence	14	2 15 0	2816	Tin	St. Erth	R. R. Michell	Marazion	ditto	Three months	—	—	—	—	1841 21	1-18
400	38 10 0	West Wheal Seton	345	34 0 0	13600	Copper	Camborne	B. Matthews	Cornwall	ditto	Two months	3374	—	—	22,249 0 0		1-15
512	5 2 6	Wheal Basset	300	61 0 0	31232	Copper	Illogan	W. Richards	Redruth	ditto	ditto	7600	—	—	56,324 0 0	1850 21	1-18
256	5 0 0	Wheal Buller	300	90 0 0	23040	Copper	Redruth	S. and R. Davy	Redruth	ditto	ditto	7482	—	—	39,762 0 0	1849 21	1-16
250	—	Wheal Clifford	560	22 0 0	5500	Copper	Gwennap	Williams and Son.	Scorrier House, Truro	ditto	Four months	3583	—	—	24,810 0 0		1-15
5000	—	Wheal Fortescue	—	0 1 6	375	Copper	Bodmin	J. Matthews	Tavistock	ditto	—	—	—	—	—		
1024	1 7 2	Wheal Kitty	14⅛	2 5 0	2304	Tin	Uny Lelant	T. Richards	Cornwall	ditto	Three months	—	—	—	—		
5000	4 10 0	Wheal Kitty (St. Ag.)	8	0 3 0	750	Tin	St. Agnes	E. King	Austinfriars	ditto	—	—	—	—	—		
480	33 0 0	Wheal Lovel	—	1 0 0	480	Tin	Wendron	W. Carne	Falmouth	ditto	Three months	—	83	—	6,802 0 0		1-24
448	19 15 0	Wheal Margaret	44	8 15 0	3920	Tin	Uny Lelant	W. S. Arthur	Penzance	ditto	ditto	—	240	—	15,613 0 0		1-24
1024	8 0 0	Wheal Mary Ann	40	7 10 0	7680	Lead	Menheniot	P. Clymo, jun.	Liskeard	ditto	ditto	—	—	1314	28,840 0 0	1839 21	1-15
80	70 0 0	Wheal Owles	—	21 10 0	1720	Tin	St. Just	J. Boyns	St. Just	ditto	ditto	—	235	—	19,308 0 0		1-20 & 1-40
198	107 0 0	Wheal Seton	150	14 10 0	2871	Copper	Camborne	T. H. Tilley	Cornwall	ditto	Two months	3066	—	—	15,568 0 0		1-15
1040	4 10 0	Wheal Trelawny	22	1 0 0	1040	Lead	Liskeard	J. Bryant	Cornwall	ditto	Three months	—	—	958	18,314 0 0		
4096	1 10 0	Wheal Wrey	7⅛	1 7 0	5530	Lead	St. Ive	P. Clymo, jun.	Liskeard	ditto	ditto	—	—	1064	18,661 0 0		

WELSH.

100	20 0 0	Brynford Hall	—	13 0 0	1300	Lead	Flint	J. Taylor & Sons.	Queen-street-place	Cost-book	Three months	—	—	117	1624 0 0		
1000	7 0 0	Bryntail	5	0 5 0	250	Lead	Llanidloes	W. Nicholson	Old Broad-street	ditto	ditto	—	—				
6000	3 0 0	Bwich Consols	⅛	0 2 6	750	Lead	Cardigan	J. Taylor & Sons.	Queen-street-place	ditto	—	—	—				
128	60 0 0	Cwmystwith	160	20 0 0	2560	Lead	Cardigan	J. Taylor & Sons.	Queen-street-place	ditto	ditto	—	—				
300	32 0 0	East Daren	90	10 0 0	3000	Lead	Cardigan	J. Taylor & Sons.	Queen-street-place	ditto	ditto	—	—	936	15785 0 0		
400	18 15 0	Lisburne	120	21 10 0	8600	Lead	Cardigan	J. Taylor & Sons.	Queen-street-place	ditto	ditto	—	—				
2500	11 5 0	Rhoswydol & Bach.	—	0 7 0	875	Lead	Machynlleth	G. Hadley	Old Jewry	ditto	—	—	—				
10000	0 12 6	Vale of Towy	⅞	0 2 3	2250	Lead	Llangunnor	T. Field	Crown-court	ditto	ditto	—	—	845	9602 0 0		

ISLE OF MAN.

2560	25 0 0	Foxdale	42	5 0 0	12800	Lead	Isle of Man	C. Townshend	Chester	Cost-book	Four months	—	—	2300	37584 0 0		
20	100 0 0	Laxey	1200	50 0 0	1000	Lead	Isle of Man	R. Rowe	Laxey	ditto	Six months	—	—	500	11253 0 0		

IRISH.

2000	11 0 0	Holyford	—	0 10 0	1000	Copper	Cappawhite	C. Hunt	Great Winchester-street	Cost-book	Six months	—	—				
20000	7 0 0	Mining Company	15¼	1 1 0	21000	Copper and lead	Dublin	R. P. Allen	Lower Ormond Quay	ditto	ditto	—	—				
470	50 0 0	Newtonards	—	4 0 0	1880	Lead	County Down	H. B. Noble	Douglas, Isle of Man	ditto	Three months	—	—	500	7255 0 0		
4000	5 0 0	Wicklow	20	0 10 0	2500	Copper	Wicklow	W. Cutter	Dame-street, Dublin	ditto	Four months	—	—				

SLATE.—The BANGOR ROYAL SLATE COMPANY have now ON HAND a large assortment of ROOFING SLATES, BLUE and GREEN, to the usual sizes, which they are prepared to SUPPLY on the usual terms, for shipment from their depôt at Bangor, or to transmit by railway; also, SLABS of all sizes. Orders to be addressed to Mr. Edwards, manager, Royal Slate Quarries, Bangor.

SLATE SLABS AND ROOFING SLATES.—The PROPRIETORS of the NEW MACHNO SLATE and SLAB COMPANY (LIMITED) have, at great cost, made arrangements to convey their produce from their quarries near Ffestiniog to Conway, to obtain the great advantage of access to the railway, giving them the facility of executing orders without the slightest delay. They trust that making Conway their shipping port will not cause them to be confounded with those hitherto known as the CONWAY SLATES, as the MACHNO SLATES are ENTIRELY FREE from PYRITES, or any metallic substance liable to OXIDATION; and, from having been tested in Wales for at least half-a-century, are found to attain a degree of hardness, by exposure to the atmosphere, unknown in any other vein. The MACHNO SLABS are too well known to need comment, but the annexed valuable testimonial from Mr. Magnus, and also a strong chemical test to which they have been subjected, will better explain their quality:—

Pimlico Slate Works, Upper Belgrave-place, London, April 7, 1855.—Gentlemen: I very readily offer my testimony to the excellence of your slabs raised at the Machno Quarries. I prefer them to all others obtained in North Wales, with one exception, and that is much of the same quality as the Machno. The slabs can be obtained of large sizes, and of every requisite thickness. They are homogeneous in texture, strong, of good colour, free from spots and other impurities, pleasant to the tool of the mason, easily planed and moulded, and will bear exposure to a much higher degree of heat than slabs from any of the Carnarvonshire quarries.

Signed, G. E. MAGNUS.

To the Proprietors of the Machno Slate and Slab Quarries.

Liverpool, Oct. 18, 1855.—Dear Sir: The experiments which I have tried on the specimen of slate, in reference to its capability of resistance to acids, enable me to pronounce it in every way capable of retaining boiling vinegar, without injury either to its own substance, or to the contained vinegar. A piece of the slate, weighing 25 grs., was exposed for 26 hours to the action of cold strong nitric acid; it was then boiled in the same acid for 20 minutes, and when washed, dried, and weighed, was found not to have lost perceptibly in weight. This I consider the most conclusive experiment. Signed, GEO. C. HUSON.

Wm. Orme Carter, Esq., Machno Slate and Slab Company.

All communications must be addressed to the resident director, Mr. T. H. Wheeler, Conway, North Wales.

SPIKES AND FISH BOLTS.—Prices and detailed information, with respect to HOPPER'S PATENTS and IMPROVEMENTS in SPIKES and FISH BOLTS, will be forwarded on application to Mr. Geo. Hopper, Houghton-le-Spring Ironworks, and Britannia Ironworks, Fence Houses, Durham. Thousands of tons of the above have been made at these works during the last ten years, for most of the principal railways in England. A liberal allowance to exporters and commission agents.

PATENT SAFETY FUSE.—The GREAT EXHIBITION PRIZE MEDAL was AWARDED to the MANUFACTURERS of the ORIGINAL SAFETY FUSE, BICKFORD, SMITH, DAVEY, and PRYOR, who beg to inform Merchants, Mine Agents, Railway Contractors, and all persons engaged in Blasting Operations, that, for the purpose of protecting the public in the use of a genuine article, the PATENT SAFETY FUSE *has now a thread wrought into its centre*, which, being patent right, infallibly *distinguishes it from all imitations*, and ensures the continuity of the gunpowder.

This Fuse is protected by a Second Patent, is manufactured by greatly improved machinery, and may be had of any length and size, and adapted to every climate.

Address,—BICKFORD, SMITH, DAVEY, and PRYOR, Tuckingmill, Cornwall.

SAFETY FUSE.—Messrs. WILLIAM BRUNTON and CO., PENHALLICK, near REDRUTH, CORNWALL, MANUFACTURERS OF FUSE, of every size and length, as exhibited in the Great Exhibition of 1851, and supplied to the Royal Arsenal at Woolwich, the Arctic Expedition, and every part of the globe.

Messrs. BRUNTON & CO. are at all times PREPARED to EXECUTE UNLIMITED ORDERS for SUPPLYING FUSE direct from their own MANUFACTORY, upon warrant that it will prove equal to, if not better, than any to be procured elsewhere.

THE HAFOD SAW MILLS.—IMPORTANT TO THE MINING INTEREST OF CARDIGANSHIRE.—These mills having gone to work on the Hafod estate, in the midst of the mining district, it will be interesting to the parties connected with them to find that a SUPPLY of TIMBER, cut for MINING PURPOSES, will always be KEPT ON HAND; and by application to Mr. Thomas, the agent at Hafod, with a few days' notice, almost any sort of wood work for mines may be obtained. A few particulars are annexed:—

Planks cut to the right length and thickness for jigging hutches.
Planks for long, round, and flat buddles and trunks.
Planks for dolly tubs and sheds, floorings, &c.
Longitudinal and transverse sleepers, for rails and wooden rails.
Ladders, and sides for ladders, and staves.
Pick and shovel hilts; beams for bobs.
Oak rings for water-wheels; backing and bucketing and arms for ditto.
Planks for ladder sollars, plat sollars, and floorings, &c.
Picking tables; timber cut for stull pieces.
Railway wagons, wheelbarrows, &c.

The proper sorts of wood will be found applied to the different kinds of work, so as to secure durability and economy.

IRON HOUSE AND SELF-SUPPORTING ROOF MANUFACTORY, WOODSIDE, BIRKENHEAD.—Messrs. WILSON and CO. beg to call the attention of Engineers, Shippers, Farmers, and others, to their PATENT PORTABLE FIREPROOF HOUSES, STORES, SHOPS, COTTAGES, VILLA RESIDENCES, CHURCHES, SCHOOLS, FARM BUILDINGS, SHOOTING BOXES, &c., either with or without self-supporting roofs; also, CONSERVATORIES, GREEN and HOT-HOUSES.—Manufactory, Woodside, Birkenhead.

N.B. These houses are so constructed that they do not require the aid of an artizan to re-erect them. Detailed plans and drawings furnished free of charge.

MESSRS. R. & J. COUPE, ENGINEERS and IRONFOUNDERS, MANUFACTURERS of HORIZONTAL HIGH-PRESSURE STEAM-ENGINES, from 10 to 200-horse power; the larger description of engines mounted with their IMPROVED EQUILIBRIUM SLIDE PISTON VALVE, which has proved itself so eminently adapted for winding and other engines.

Also, MANUFACTURERS of their IMPROVED BLAST ENGINES, PUMPING ENGINES, &c. (Vide Editor's Notice in the *Mining Journal*, Aug. 30, 1856, p. 593, under the head of Improvements in Donkey Engines.)

N.B. NOW ON HAND, completed, and in course of erection, a FEW FIRST-CLASS STEAM-ENGINES (HORIZONTAL):—viz., Two very powerful engines, of 30-horse power, polished, 20 in. diameter of cylinder, and 3 ft. stroke; the above engines are mounted with R. and J. Coupe's improved equilibrium slide valve. Two ditto, of 20-horse power, polished, 17 in. diameter of cylinder, and 3 ft. stroke. One ditto, of 20-horse power, black, 17 in. diameter of cylinder, and 3 ft. stroke. Two ditto, of 12-horse power, polished; two ditto, black, 12 in. diameter of cylinder, and 3 ft. stroke. One ditto, of 12-horse power, polished, 12 in. diameter of cylinder, and 2 ft. stroke. The above engines are calculated either for colliery purposes or for manufacturing, either with or without governors.

Also, a FEW of their IMPROVED DONKEY ENGINES. For high-pressure purposes, the cylinders are 4½ in. diameter, and the pump 3 in.; for feeding low-pressure boilers, the steam cylinders are 6 in. diameter, and pump 3 in.; delivery 3000 gallons per hour. Other sizes made to order.

Clayton Foundry, Wigan.

PUMP BUCKETS.—IMPORTANT TO COLLIERY AND MINING PROPRIETORS, SHIP OWNERS, ENGINEERS, &c.

KENNEDY AND EASTWOOD'S PATENT EXPANDING RING CLACK BUCKETS.—These buckets are APPLICABLE to every description of AIR and LIFT PUMPS, and are being generally adopted, on account of their great durability, entirely dispensing with the use of leather or gutta percha. Being made of metal, the friction is greatly reduced, and have been proved to require at least one-third less power to work them than buckets made of either leather or gutta percha, and doing their work more efficiently.

The following extract from a testimonial from Messrs. Harrison, Ainslie, and Co., Lindal Moor Mines, Lancashire, who have now several in use, fully proves the foregoing:—"Having given your Patent Pump Buckets a fair trial, we are happy to bear testimony to their value, especially in muddy and sandy water. The first we put in has worked well ever since (eight months ago), whereas previous to our putting it in we changed the buckets three times every week."

Terms, reasonable, with other information, will be supplied (gratis) on application to Messrs. Kennedy and Eastwood, patentees, Ulverstone, Lancashire; Messrs. Hewett and Allott, accountants, Central Chambers, Sheffield; and Messrs. H. J. Morton and Co., 2, Basinghall-buildings, Leeds.

COALS FOR GAS AND COKE, of very superior quality, yielding 10,000 ft. of gas per ton, and producing COKE peculiarly adapted for locomotives, foundries, and smiths, MAY BE HAD in any quantity, direct from the collieries, by applying to The Brithdir Colliery and Coke Co., Newport, Monmouthshire.

Original Correspondence.

THE COPPER TRADE, AND THE SMELTERS.

SIR,—Your correspondent, "Germanicus," is evidently one of those who either has, or thinks he has, a purpose to serve by raising a cry of monopoly and outrageous profits against the copper smelters, though evidently knowing very little of the matter, and therefore he is not very likely to change his course in consequence of anything I may say upon the subject. His repeated solicitations for information on the subject of 21 cwts. to the ton, and surplus produce over assay, are not made to be convinced that he has found a "mare's nest," but to lead the ignorant to suppose that these are some of the many wrongs inflicted by greedy smelters on suffering, simple miners. However, he asks for my opinion, and I give it him. If a miner will take a parcel of ore which shall contain three million pounds of dry ore, or any other quantity, and divide it into three equal parts, and sell one of those parts 20 cwts., another 21 cwts., and the third at 22 cwts. to the ton, I assert that he will obtain as much for *the parcel* sold 22 cwts. as for either of the others, and that he will not obtain more for that sold 20 cwts. than for that sold 21 cwts.; of course, the price per ton of 20, 21, and 22 cwts. will vary, but the proceeds of *the parcels* will not vary. In fact, the smelter does not care whether the ton consists of 20, 21, 10, or 30 cwts., except that 21 cwts., from long usage, is interwoven with all his calculations, and all his contracts for carriage, freight, smelters' wages, &c.

This is exemplified in the lead ore ticketings; some ores are sold 20 cwts. to the ton, *wet* ore; some 20 cwts. to the ton, *dry* ore; some 21 cwts., dry ore. Does "Germanicus" suppose that the lead smelter pays as much per ton for the first denomination of ton as for the second, or as much for the second as the third. I believe Messrs. John Taylor and Sons, of London, the eminent copper and lead miners, sell lead ores by ticket under all three classes, and I doubt not, if he asks, they will tell "Germanicus" that, as far as realisation of value goes, it is immaterial what actual weight is called a ton, provided all parties are aware of it. If the Devon Great Consols Company choose to sell their ores next month by the ton of 20 cwts., there is nothing to prevent them; but they are too well aware of the exigencies of business to dream of realising for 20 cwts. what they obtain for 21 cwts.

Then as to surplus produce: it is all taken into account, just as the 21 cwts. are. The experienced smelter looks to his *furnace* produce on which to found his biddings for ore; and the *crucible* produce is only of use to him as the indicator of what his furnace produce will be. In copper smelting, the furnace produce exceeds the assay; in lead smelting, it falls short of it, but each smelter takes this into account, and balances it, the one by bidding more, the other by bidding less, than his assay would warrant. As I do not intend again to occupy your columns, I will conclude by saying, that if half a dozen associations of miners, or of non-mining capitalists, will establish smelting works, they will discover sooner than they expect, that copper smelting has two sides, and that the dark obtrudes itself as often as the bright; and that all the assertions of undue, or even of large profits, are moonshine; or where individuals appear to have realised them, it has been by a happy concurrence of ability, opportunity, industry, and other circumstances, which few must expect as their own lot.

I will also say, that if the copper miners of this country, or rather the empty talkers and writers in your columns, could conjure up twenty additional copper smelters, it would be a black day for Cornwall; for, whatever may have been the profits made under the present system, it has been one eminently conservative of the price of the article, and most beneficial to the mining interest. Introduce into the trade a number of people unacquainted with its details, scrambling, in ignorance of markets, to sell their produce, and you will soon knock off 5 or 10 per cent. from the value of copper-producing materials in England, compared with what would be obtained under the present system, under the same circumstances of supply and demand.—*Birmingham, Jan.* 28. A MANUFACTURER.

THE COPPER TRADE, AND SMELTERS.

SIR,—I am convinced that none of your readers can be more surprised at the character given them by "A Manufacturer" than the smelters themselves. To depict them as anti-monopolists is too ridiculous to be laughed at even. It reminds me of the grandfather of Frederick the Great, who during his fits of gout amused himself with painting the likenesses of his grenadiers, when, if the picture did not happen to resemble the grenadier, he settled the matter by painting the grenadier like the picture; or, what is more to the present purpose, the story of Lavater, who, when called on to distinguish between the portraits of Kant and a malefactor, confounded the highwayman with the philosopher. "A Manufacturer" betrays such want of knowledge of the present state of the details of the smelting trade, that nothing but his evident respectability and station would entitle him to a reply. A sojourn of a few months in Cornwall, and an intercourse with some of our most intelligent miners, who might be independent also of the clique, would work a great change in his sentiments. For ourselves, I can assure him that we have nothing to learn on the subject which he can teach us. We are constant eye-witnesses of the working of the system, and if we speak out rudely and roughly, the ebullition is a natural one, arising not from what we hear or read of, but from what we have *seen* and *felt*.—*Redruth, Jan.* 24. A MINER.

WHAT IS A WATER GAUGE?

SIR,—You referred in your last Journal to the case pending between the Government Inspector of Coal Mines and the Dowlais Iron Company, but I think your remarks were unusually brief, considering the importance of the question. In the opinion both of myself and many others this action has been brought about from the want of practical knowledge on the part of those in power. Those conducting the prosecution should have proved that it was a common practice to *substitute* self-acting (?) gauges for the gauge cocks, and that there would be no difficulty in finding manufacturers who entirely dispense with the gauge cocks. Yet, although every means, justifiable and unjustifiable, were used to make the case for the prosecution good, I cannot see how, upon the face of the evidence for the prosecution, a verdict against the defendants can be given. Were such a verdict given, it would only prove that the fact of the Queen being prosecutrix had had an improper influence, or that 75 per cent of the boilers in the United Kingdom are working upon a system by which the lives of thousands are placed in danger, and that engine manufacturers generally affix an instrument which is totally useless.

Passing over the evidence for the defence, which merely shows that in the opinion of the witnesses the cocks are the best gauge (the Act says that a proper steam gauge, not steam *gauges*, shall be provided), and it appears that the witnesses for the prosecution are not unanimous as to the inutility of the cocks. The most remarkable evidence is that of Mr. Robt. Longridge, who states that there are 15,000 steam engines at work in Manchester. Of this number the "Association for the Prevention of Steam-boiler Explosions," of which he is the chief inspector, has 1456, or less than one-tenth under their care. Mr. Longridge states that all the engines he inspects have two gauges, some three, and that "there are a *great number* of boilers which have no cocks, the society not considering them indispensable nor even necessary to ensure safety; a proper gauge should show correctly at all times the height of the water in the boiler; the *gauge cock is a gauge*, but a very imperfect one; if the water be higher than the lower cock there is no danger, but you cannot always tell it is higher; if water and steam come out you cannot tell whether the water is 2 or 3 in. below it." Now I would ask Mr. Longridge a few questions, to which, if he would kindly give answers, he would be rendering great service to humanity, by putting them in possession of facts which would enable them to take measures for, as far as possible, preventing loss of life from steam-boiler explosions. My questions are:—Are there 1500 boilers in Manchester without gauge cocks, or in other words, ten per cent? He says a very large majority.—How does he argue that the glass is a proper gauge, and that both the glass and float show the approach of danger more readily than the cocks, although admitting the liability of the glass to become foul and of the float to stick?—Would water flow from the lower cock for two seconds if the water were 2 in. below the opening?

The reply to these questions will remove many difficulties. The remaining evidence was that of Mr. Rennie, who stated that he supplied the Government with engines; they were in the habit of fitting up all their engines with three cocks and the glass gauge; that of Mr. P. Reid, colliery manager, who admitted that "he would not trust to a single float or a single glass gauge altogether." Mr. John Martley, locomotive engineer on the South Wales Railway, said that they invariably had cocks and tubes for locomotives. Mr. Ramsay, C.E., and Inspector of Engines for the Board of Trade, preferred the float. If the float were always in proper order it would be a perfect and sufficient gauge. He did not know any one instrument, nor combination of instruments, that would always give the exact height of the water without sometimes requiring adjusting. Mr. Nixon knew of only two places where they depended solely upon the cocks. Mr. Dimman, engineer to the Board of Admiralty, considered it was no excuse to say a man would trust to self-acting instruments, if employed, without testing them.

I may state in conclusion that Mr. James remarked that he thought one of the most telling facts in favour of the cocks was, that at Cyfartha they had 80 boilers, and during 45 years had not had a single accident.

Jan. 29. OBSERVER.

DOES COAL EXIST NEAR LONDON?

SIR,—I am much obliged to you for the honour that you have done me in inserting my letter in your Journal of the 14th, on the great probability of coal being found somewhere in the centre of the district between Beachey Head and the chalk hills east of Folkstone; and I shall be very happy if the ideas I have suggested should lighten the expenses and labours, and ensure the success of the gentlemen who you say have determined to engage in the search of it. I was not aware that I was opposed to the Geological Society, as a body, in entertaining these views, which I rather consider, for the reasons which I have given, as a necessary consequence of their principles, so far as I understand them; though I had reason to think that the hypothesis that I have started, of the chalk formations, including the sand underneath it, having been formed over a pool, or great sea, of 220 miles diameter, might be a new, and, perhaps, heretical theory.

I am very imperfectly acquainted with the works on geology, but having been from a youth very fond of collecting shells, minerals, and other fossils, whenever I have had an opportunity, and wherever I have been, I have paid a sort of desultory attention to the subject. But, in many instances, from the mass of knowledge I had obtained here and there, I have formed my own conclusions from my own observations and reflections, and found them afterwards confirmed by the opinions of the learned upon these matters, rather than been taught by others; not from contempt of their teaching, but, from want of time and opportunities. For the last several years I have rested on the theory, that the crust, or shell, of the world, has been gradually formed, and the size of the world probably increased since its first creation by a number of concentric beds of sand and mud, the lower strata of which have been converted by intense heat into granite and slate, whilst the upper ones, by more moderate heat, or by time and pressure, and the chemical affinity of the substances in them, have been converted into sandstone and limestone, or clay, which vary in their nature, as magnesian chalk or aluminums, from the preponderance of the different salts in the waters that washed over them. But the other day I was walking to visit the gravel pits at Bloomfield, near this place, with Mr. Sladden, a very intelligent gentleman, who has a farm in the neighbourhood, and he informed me that he had seen a piece of timber as big as a sign-post dug from below the iron-bound gravel, at least 12 ft. below the surface of maiden earth, and recollecting that I had read of pieces of such timber being continually found in a semi-fossilised state on the muddy beach of this coast, it struck me that, in my ideas of the concentric formation of seas and strata, I had forgotten my woods and deer walks, and all that I had read of immense boles of trees being found in different railway cuttings and quarries, in lime and sandstone, and immediately saw these must have grown somewhere, and that the system I had imagined, or adopted, of concentric strata, however true generally, must be modified for particular eras and districts. Subsequently, on reading Dr. Millingen's work—which I before alluded to—I found him stating that the stratum of chalk at Blancnez, is not by many scores of feet so thick as that at Dorn, and on the English coasts, whilst the layers of sand and Folkestone marl that follow it are so slight, that it is even doubtful if they may not belong to the next order of strata. This seemed to me only to be accounted for by the supposition that in the neighbourhood of Boulogne lay the shores of some antediluvian sea, which had stretched out, deepening as it extended towards Dover; and this supposition was again confirmed when I found my sketches of the cliffs at Seaton, and my notes made there, and recollected my observations of the coast. I thought, however, that the irregularities of the chalk being found at Lyme Regis immediately on the lias, and then again at Seaton immediately on the new red sandstone, might be possibly accounted for, by the chalk and greensand strata having been in a very moist state when the great eruptions took place, that threw the whole crust of the globe on its beam ends, and to their having oscillated back, after being upheaved over these westward strata; but, at any rate, the appearance of the coal at Boulogne without the intervening strata of lias and new red sandstone proves that the great fern fields or bogs, which produced the coal beds after they were submerged, were not covered in all districts by the same formations; and very likely, at different eras, the earth has been as much pock-freckled as the moon appears to be.

It is probable that it is owing to the thinness of the strata round Boulogne that the shock that rent the chalk asunder was able to throw the coal beds and the oolite up to the surface, which now lie under the Tilgate stone in Sussex; still, however, it is also possible that the lias and new red sandstone may extend thus far, and, therefore, gentlemen who have undertaken the works in Sussex must not be too sanguine of immediately arriving at the coal after piercing the oolite.

In my letter, I should have written that the lias and new red sandstone appears to have formed the western and north-western shores and beach of the pool I imagine; and in your observations upon my letter you speak of the coal measures having been thrown up above the chalk, which is liable to misconstruction, as they have been thrown up from under the chalk, but, as far as is yet known, are under the strata of the Tilgate stone and Hastings sands, or rather under the surface in the district, which lies east and north-east of the Hastings beds, and of which a line drawn from the neighbourhood of Winchelsea to some point west of Folkstone may indicate the seaward boundary. The coal measures must be looked for on a curve or perpendicular cutting some point in that line, and trending towards the chalk and intervening formations rising to the north of it.—*Herne Bay, Jan.* 27. JOHN PERCEVAL.

IRON SLAG—ITS APPLICATION TO COMMERCIAL PURPOSES.

SIR,—I trust it will be admitted that I have proved that bricks, tiles, pipes, and pottery can be made cheaper, and more durable, from iron or clay slags than from any other material, having neither drying nor burning to contend with, wherein lies all the difficulty to be yet overcome by the advocates of machinery *versus* hand-making by the common process. And is it not reasonable to conclude, that as iron ore is plentiful in the neighbourhood of London it will soon be manufactured where the articles produced are required, whether coal be found in the neighbourhood or not, as the estimate for bricks alone for London is two hundred millions per annum, and it appears they are now supplied within a circuit of 100 miles. If the carriage, coals, and labour attending the drying and burning of bricks, &c., are saved by the use of slag, it will also enable the inhabitants of London to use their dust and ashes for disinfecting the greater part of their present sewage materials—or, rather, preventing infection taking place, by mixing and removing the same in a dry state, before they are washed into the drains; and it may also be applied to the contents of the sewers for disinfecting, instead of lime, being much cheaper, and on the spot, and I should think with far more benefit, particularly if used for agricultural purposes, as all earths are found to be the best for disinfecting noxious materials.

Blisworth, Jan. 28. W. G. ELLIOTT.

IRON SHIP-BUILDING.

TO ALL INTERESTED IN THE EXTENSION OF IRON CONSUMPTION.

SIR,—As your Journal represents the iron interest of Great Britain, may I request the favour of your placing a matter before them which merits their united efforts to aid its being carried out, for the ostensible purpose of developing efficiency in the mechanical construction of this important branch of commerce.

The many unaccountable losses to iron ships have created a prejudice that ought to be eradicated from the minds of the maritime community. Your Journal has, from time to time within the last six months, pointed out the unsoundness of the present principle of constructing what are called iron ships.

In order that Great Britain may build ships for the world, I beg to suggest to the interest that will reap the benefit, that they should come forward, and back my ideas in the construction of a line of steamers for the Liverpool and New York trade, to be built in accordance with the principle propounded and patented by myself—admitted by competent persons to be the climax in the art of iron ship construction. This mode of building efficient iron ships will prove to the world the superiority that iron possesses over timber. The object that has presented itself to my mind in recommending a line of steamers of 5000 tons each, to put England and America within six or seven days of each other, is—1. To let Brother Jonathan see that he is used up in wooden ships, and that to compete with England he must either send and build his his ships on this side the Atlantic, and sail them on English registers, or else repeal the navigation laws of the United States, as under existing regulations the stars and stripes cannot be hoisted on board ships built out of the country.—2. The cost of labour in America is against their building.—3. As also the duty on the importation of iron into America.

Within the last six months I have been visited by many gentlemen from America, respecting the mode of constructing iron ships; and from the information I have placed before them, they unanimously coincided with me, that if the Americans are to be a ship-owning nation they must resort to iron ships, and to do that they must conform to my previous remarks.

The calculation for such a line of steamers, taken from data since steam has been used between the two countries, justifies my saying it would pay an annual dividend of 10 per cent., and clear the first-cost of the vessels also in ten years.

A line of steamers, such as my knowledge of the trade would dictate to be requisite, would combine increased speed with unexampled safety; and it is the opinion of some of the first American houses that they would carry all before them. Independent of Government subsidy, they could not fail being good property. JOHN CLARK, Jun.

21, *Exchange-buildings, Liverpool, Jan.* 27.

CALIFORNIAN WATER COMPANIES.

SIR,—Your correspondent, "J. A.," in last week's Journal, admits that Californian water companies must be "extremely profitable speculations," but is afraid that the number already established in that country will reduce profits, and appears afraid of even *one* solitary work of the kind being constructed by English capital.

He need be under no apprehension about the Californians making too many works of that description: he may depend upon it, all they can make will be required, and will find profitable employment; and as regards the English company referred to, *they have secured a monopoly of the supply of water for a district of about* 600 *square miles of proved auriferous ground*, and at all events *they* can have nothing to fear from competition.

The establishment of such companies must unquestionably have the effect of making mining a more settled and less precarious occupation, and, by so doing, attract *permanently* an immense number of persons to follow that pursuit as a fixed trade or calling; and the promoters of them are deserving of every assistance and encouragement in carrying out their object, calculated, as it most assuredly is, to largely augment the supply of gold, benefit the labouring classes, and increase the trade and commerce of England, whilst the investors in such undertakings will realise profits of a magnitude hitherto unknown and unheard of in this country; and doubtless all concerned will be well pleased and satisfied with the results.

City, Jan. 28. A RESIDENT IN CALIFORNIA.

POSTAL COMMUNICATION WITH GERMANY.

In the Board of Trade returns, we have conclusive evidence of the rapid strides which we are making in our commercial intercourse with foreign nations, both in Europe and elsewhere; and amongst the countries to which our merchandise is more largely exported, and which show more favourable progress, we find our neighbour and ally—France—occupying the most important position. This satisfactory state of affairs has been considerably more marked within the last two years than at any previous period, and we cannot but conclude that, whatever may have been the influence of other circumstances, the reduction in the charge, and increase in the facilities, for postal communication between the two countries has tended greatly to advance the industrial interests of both France and England; and that from the conveniences which now exist for the rapid transmission of intelligence from one country to the other, difficulties which, under the ancient system, would have been inevitable, are entirely avoided.

It will be unhesitatingly admitted by all engaged in commerce, that our connection with the industrious and fertile districts of the Rhine, Prussia, Austria, and, indeed, nearly the whole of Europe, is gradually increasing, and will, no doubt, continue to do so; yet, with the exception of France, an answer to a communication cannot be obtained in much less than a week, even although the most important transaction is to be decided by it. It is now not improbable that this state of things will be changed, at least so far as concerns Germany and the North of Europe, as the London, Harwich, and Continental Steam Packet Company has entered into an arrangement with the Eastern Counties Railway upon advantageous terms, and, have secured the co-operation of the authorities of the Dutch-Rhenish and other inland navigation and railway establishments of Holland and Germany, all of whom have promised their support to the fullest possible extent. This company will commence business early in March by the establishment of a line from Harwich to Rotterdam, by which route letters and passengers could be conveyed to Oberhausen in upwards of four hours less than by the Dover and Ostend route. From Oberhausen, all parts of Westphalia and the other provinces of Prussia are speedily reached, and it is also the most central town that could be chosen for opening up the communication between England and France and the North of Europe. As regards placing London in closer communication with Germany, the Harwich route has many advantages over the Dover and Ostend route, one of the most important being that the dangers and delays of the intricate navigation of the Swin and the mouth of the Thames are avoided.

As it is ever necessary that, where a line of communication is to be established, there should be a populous and industrious district to support it, the very proper question which suggests itself is—What kind of country is the new line to communicate with? In the instance of the London, Harwich, and Continental Steam Packet Company this query is very easily answered, inasmuch as the single line from Harwich to Rotterdam would secure advantages which would amply repay the shareholders for the outlay of the whole capital of the company. Holland is of great commercial importance of itself, and is particularly free from internal disturbances; but there would also be opened up, by the assistance of railway and river communication, an immense field for enterprise throughout Prussia.

The communications from our own correspondent, in relation to the extent and facilities for the carrying on of mining and ironworking companies in Westphalia and the Rhine Province, must be fresh in the recollection of our readers, and although we do not intend to assert that Prussian iron can ever be brought into the English market with advantage, the provinces to which those letters refer are also most busily engaged in the manufacture of articles which are particularly adapted for export, and which, indeed, are already well known in all the great markets of the world. From these letters it will be evident that the Germans are a most industrious people, and, although probably as far as mining is concerned the Cornish miner would do a larger quantity of work, it is evident that the work done by the Germans is excellently executed. Although the Englishman can turn out more iron, and make larger profits than the German from a given number of blast-furnaces, the latter would, under English tuition, readily acquire the knowledge of the English system.

Regardless of the iron manufacture of Westphalia, there is an immense industrial population engaged in almost every description of work; and, from the fact that nearly every man lives upon his own freehold, and is master of his own business, the picturesque banks of the Rhine may almost be looked upon as the abode of one of the happiest and most prosperous communities in Europe. To this district the London, Harwich, and Continental Steam Packet Company will afford greater facilities, for the transit of their productions to the markets in which they are required, than they have before enjoyed, and in all probability will cause an increased amount of German manufactures to pass through the hands of English merchants; whilst, even should there be no such increase, the English will not be losers, and we may at least anticipate the establishment of a safer and more speedy postal route, which must benefit the commerce of all countries which now are supplied *via* Dover and Ostend.

THE ISTHMUS OF SUEZ QUESTION.

The "Gates of the East" is a subject in which British capitalists will shortly be called upon to interest themselves—a company having been projected for carrying out the idea of making a communication between the Mediterranean and Red Seas by a gigantic canal through the Isthmus of Suez. The facilities which have been secured to the commercial community by the establishment of the Overland Route to India has not unnaturally led to the anticipation that from such an undertaking as a ship canal through the isthmus still further advantages might be obtained. From time to time efforts have been made to carry out the proposition, and the company now projected will no doubt prove the value of the scheme, as it is supported by some of the most eminent practical and scientific men both of England and the Continent. As early as 1823, the Bombay Government discovered that the Cape route was too tedious for the transmission of their despatches; but it was not until twenty years after that the enterprise was fairly carried out. We have previously alluded to the labours of Mr. Ferdinand de Lesseps, to whom the idea of this canal is due, but a short *resume* of the manner in which he has matured his plans will be ample evidence that the idea is not Utopian.

In October, 1854, Mr. de Lesseps visited Egypt, in consequence of an invitation from the new Viceroy, Mohammed Said, who for twenty years had been his friend, and in the course of a journey across the Lybian desert, from Alexandria to Cairo, the question of cutting through the Isthmus of Suez was first communicated. The Viceroy requested a memorial upon the subject and, as their views coincided, he issued to the consuls-general of foreign powers a firman, destined to receive the sanction of the Sultan, granting the necessary powers to construct a canal between the two seas. At the same time the Viceroy ordered his two French engineers, Linant Bey and Mougel Bey, to accompany Mr. de Lesseps in an exploring expedition to the Isthmus of Suez, and to complete, by a fresh examination of the ground, the investigations they had already made: this expedition was made in Dec. 1854 and Jan. 1855, and resulted in a favourable report upon the scheme, to which Mr. de Lesseps found, upon proceeding to Constantinople, the Sultan was willing to give his sanction. In 1855 Mr. de Lesseps visited England, with the view of bringing the subject before the public. A commission was afterwards appointed, composed of eminent engineers from all European countries, and arrived in Alexandria in Nov. 1855; the commissioners stated that a direct canal from Suez to Pelusium was the only solution to the problem. The question from an engineering point of view having been fully solved, the Viceroy of Egypt granted Mr. de Lesseps a second charter declaring the burdens, obligations and services to which the proprietors of the Suez canal will be subjected, the concessions, immunities, and advantages, to which they will be entitled, and the facilities which will be accorded them.

The charter states that the works to be executed are:—A canal, navigable by large vessels between Suez and Pelusium; a canal of irrigation adapted to the river traffic of the Nile, and connecting that river with the Suez canal; two branches for irrigation and supply striking out of the preceding canal in the direction respectively of Suez and Pelusium—these works to be completed within six years, and four-fifths of the workmen employed to be Egyptians; Lake Timsahah to be converted into an inland harbour fit for vessels of the highest tonnage; a harbour of refuge at the entrance of the maritime canal into the Gulf of Pelusium, and the necessary improvements in the port and roadstead of Suez—the Egyptian government to have a claim of 15 per cent. per annum on the net profits every year. In return, the Egyptian government makes the following concessions:—A free grant of all the lands (not the property of individuals) which may be found necessary for the purpose of the works, and the use and enjoyment of all uncultivated lands which shall have been cultivated at the care and expense of the canal proprietors; the privilege of drawing from the mines and quarries of the state, free of charge, all necessary materials for the construction and maintenance of the works and buildings of the undertaking; and free importation of the machinery, &c., to be used in the construction of the works, or working of the undertaking. It is provided by the charter that the canal from Suez to Pelusium shall always remain open as a neutral passage to every merchant ship; that for the right of passage through the canal the maximum toll shall be 10 frs. (8s.) per ton on ships and per head on passengers, and that the provisions of the charter shall remain in force for 99 years after the opening of the canal.

The Viceroy of Egypt has made a subscription of 1,200,000*l.* towards the expenses of the undertaking, and has promised, in the event of a company being formed under the auspices of Mr. de Lesseps, to supply whatever number of native workmen may be required, at the daily pay of one franc per man; and finally, as the freshwater canal from the Nile is a necessary condition to the commencement of labours on the grand canal, from the fact that no water to supply the wants of an army of labourers can be found in the arid and sandy plains of the isthmus, the Viceroy has commenced constructing this portion of the works at his own cost, with the intention of subsequently making it over to the company at the prices laid down in the original estimates. A striking instance of the manner in which great national works are executed in Egypt, by a general levy of labourers, has recently been furnished by the cleansing of the great Mahmoudieh Canal. For some years past this canal had been getting choked up with mud, and, although the traffic upon it was extremely active, it was becoming somewhat difficult. The canal is sixty miles in length and very wide; 10,000,000 cubic feet of muddy sediment had to be removed from the bed of the canal, and this sediment was used to make a carriage-road 32 ft. broad from Alexandria to the Nile. The time allotted to the work was one month, and the number of workmen fixed at 67,000. The Governor of the province sent 115,000 men, and the work was completed in 22 days. The number of sick among the workmen did not amount to five in a thousand, and they were always well provided with necessaries.

The ship canal will be about 90 miles in length, and 330 feet wide at the waterline, and its bottom will be 20 feet below the level of low water in the Mediterranean. The present port of Suez is to be deepened to 25 and 29 feet below low-water mark, over a superficies of about 50 acres. It is to serve for the embouchure of the canal, and will communicate with the roadstead by an outer port, formed by a channel 1830 feet wide. Beyond the bank of sand which forms the enclosure of the roadstead this channel will be protected by two jetties of rubble work carried to a depth of 20 feet. Of these two jetties, one will be 20 feet wide at the crown, and the other 13 feet, and they are to be surmounted by a parapet 3 ft. high. The foundation will be formed of natural blocks taken from the foot of the Attaka mountains on the west shore of the roadstead. For the Grand Maritime Canal the total quantity of earth to be removed is 3,307,077,985,510 cubic feet, of which quantity 1,581,710,000,000 cubic feet are to be excavated to the level of low water in the Mediterranean, while 1,725,367,985,510, being below this level, must be excavated under water. For the dry works, supposing each labourer to do 70 cubic feet per day, it would only require 15,250 for five years. The excavations under water can be completed by 40 single steam-dredging machines of 20 horse-power, within 5 years, while dredging-machines of greater power would do the same work in less time and at less cost. The number of cubic feet of earth to be removed in cutting the canal of communication between the Nile and the Suez Canal, is 361,230,940, and the small canal of irrigation will require the removal of 77,647,500.

In the first year, the canal of communication, with its locks and the irrigating canal, are proposed to be completed, with 20,898 labourers. In the second year, eight dredges will be mounted in the harbour of Suez to excavate the channel and the foundations of the jetties. Fresh water will be thrown into Lake Timsahah to set to

work all the other disposable dredges. Thirty thousand workmen will perform all the clearance in the extent of the Bitter Lake, and for the remainder of the canal. They will prepare a trench in the ground to 6 feet below low-water, and so form a channel 45 feet wide, which will enable the barges and machines to pass and repass the whole extent of the isthmus. All the force will be applied to form a communication between Suez and Lake Timsbah, and consequently between Suez and the Nile, and the fixing of the sands and irrigation of the lands will commence. In the third and fourth, the communication of Lake Timsbah with the Mediterranean will be opened, and all the disposable force will be employed in making the scouring basin, and erecting the jetties—employing 20,000 workmen. In the fifth and sixth years, the same operations will still continue, but with fewer men, as the dredges will perform the principal part of the work.

It is estimated that the total cost, including all contingent expenses, will amount to 8,000,000*l.*, being less by one-third than the sum expended on the railway from London to York, or from Paris to Lyons. A prospective revenue (commencing in 20 years) of 120,000*l.* per annum, is anticipated; and the annual revenue from the opening of the canal will be, at a moderate calculation—624*l.* for tolls on the canal of communication, 600,000*l.* for tolls on the Suez Canal, and 30,000*l.* port dues of Lake Timsbah=636,240*l.* This amount will, after payment of the expenses of maintenance and management, represent the minimum interest on the capital of 8,000,000*l.* A multitude of revenues are, however, passed over in silence—such as the supply of water to the population of Suez and Port Timsbah, rent of stations for watering ships, rent of magazines and buildings which have been employed in the execution of the canal, and the towing of vessels by the steamers purchased by the company for the service of the dredges and the transport of materials. There is also a large field for the extension of commerce in the vicinity of the new highway to India and the East—Abyssinia, Yemen, Hedjaz, Muscata, and the coast of Africa, being rich in coffee, gum Arabic, wax, skins, ivory, wool, indigo, mules, timber, and cabinet woods. Along the coast of the Red Sea are rich mines of sulphur and lead, quarries of marble and porphyry, and extended beaches suitable for the establishment of salt pits.

It is stated that Great Britain alone stops the way. Two things are wanting to the to the execution of the project and the security of those who assist in it—the sanction of the Sultan as suzerain of Egypt and an understanding among the maritime nations of Europe declaring the canal through the Isthmus of Suez a neutral passage, open at all times to the ships of all nations. The assent of England to an international treaty, embodying this principle, is indispensable, as England by Malta and Aden controls the approaches to the canal. We may remark that the promoters, confident in their scheme, "solicit controversy, and defy it," and we can only hope that the subject will be fully discussed, and that the most careful calculations may be made previous to its adoption, in order that there may be no disappointment experienced hereafter. That the canal, when constructed would be of commercial importance there can be no doubt, the sole questions being—the practicability, the cost, and the remuneration which will be secured to those who invest their capital in its construction, and no doubt the projectors will be able to satisfactorily prove the benefits to be derived from the undertaking.

STEAM-BOILER EXPLOSIONS, AND THEIR PREVENTION.

Last week we noticed the meeting of the Association for Prevention of Steam-Boiler Explosions, and for Effecting Economy in the Raising and Use of Steam; the report of their chief inspector (Mr. Robt. B. Longridge) states that the number of boilers found to be in a dangerous condition was 143; 22 from over-pressure, 37 from corrosion or failure of plates or angle-iron, 6 from insufficient safety-valves, 24 from inoperative safety-valves, 35 from inoperatives water-gauges, and 19 from injury resulting from deficiency of water. The number of boilers reported under the head of "corrosion," or "failure of plates," may not be considered great, but the instances where minor repairs have been necessary have been very considerable. The corrosion so frequently observed in the interior of boilers is evidently caused by the presence of acids in the water. Dampness existing in the seating is another cause, and he (Mr. Longridge) concludes that in the majority of cases leakage and fracture of the plates at the underside of a boiler originate from imperfect circulation of the water; the mode of remedying these evils which he would suggest is to fix in the boiler sheets of iron to separate the ascending and descending currents or, where this cannot be done for want of space, to convey a large pipe, communicating with the upper part of the boiler, underneath or within the boiler, with several branch pipes to supply water for the ascending current.* In six instances only have boilers been found insufficiently provided with safety-valves, and although not unfrequently safety-valves have been found inoperative from the negligence or recklessness of the attendant, he was far from thinking that that was the common cause of explosion. One example, however, of almost incredible ignorance is deserving of notice. The lever of the valve was firmly wedged down, so as to render its opening impossible. The fireman, upon being questioned, acknowledged that it was his usual practice to do this on stopping the engine to prevent the water being blown out of the boiler, and he did not see how there could be any danger while the engine was standing. He considers the glass tube the most perfect gauge; where the glasses were found inoperative the passages had been choked with sediment, to which they are very liable where the water is dirty, unless frequently blown through. The majority of boilers in the district are of the Cornish or flued construction, and, though inferior in strength to plain cylindrical boilers, generally receive the preference on account of superior economy in generating steam. The weakest parts in these boilers, as is well known, are the flues, which, in case of a deficiency of water, are very liable to collapse; it seems, therefore, advisable in high-pressure boilers of this construction, to strengthen the internal flues, if of considerable length, by external rings of T or angle-iron, or by joining the plates with flanged seams. The cylindrical boilers without internal flues, though well-adapted to high-pressure, do not contrast favourably with flued boilers in economy of fuel. The Galloway or Multiflued boilers are much approved of by many; but, in the opinion of Mr. Longridge, multitubular boilers will be found eventually the most economical, though hitherto the necessity for frequent repairs has brought them into much disrepute. The economy of high-pressure steam is now generally admitted, but there appeared to him to be much misapprehension as to the source of this economy. By many it is imagined that it is derived principally from the generation in the boiler. This opinion seems to have been formed from the observed fact that the higher the pressure the more rapid the increase; but it has been satisfactorily proved that the quantity of fuel required to evaporate a given quantity of water increases with the pressure. Thus, more fuel is required for water under 90 lbs. than under 10 lbs. pressure; from which it appears that no economy will result from the generation of steam at an increased pressure, unless accompanied by a proper use of it in the engine. To work non-condensing engines with the greatest economy it is necessary so to arrange the valves that the steam will be reduced by expansion nearly to atmospheric pressure before escaping from the cylinder. In condensing engines the steam should be cut off at such a portion of the stroke, that at its termination the pressure of the steam will be reduced by expansion to 8 or 10 lbs. below that of the atmosphere—otherwise the steam has not done its full work. It is the common practice of cutting out a small V piece on the steam side of the valve, the professed object being to admit the steam more gradually to the cylinder, and thus prevent a sudden shock. To some extent this effect may be produced, but there will at the same time be the disadvantage of wire-drawing the steam and admitting it to the cylinder when the valve should be entirely closed. A better remedy, unaccompanied by these disadvantages, is to arrange the valve so as to close the exhaust-port before the termination of the stroke, so that the steam within the cylinder must be compressed as the piston continues its course, and will increase in pressure as the space occupied is diminished; this mode has been found satisfactory wherever adopted. What is chiefly required to improve the condensing engine, and make it equal in economy to the compound engine is a simple variable expansion motion, capable of regulating the supply of steam according to the load, without a reduction in the initial pressure; an evil to which most engines are subject by the action of the throttle-valve.†

COMPRESSED-AIR ENGINE.—Mr. C. Randolph read a paper at the meeting of the Institution of Mechanical Engineers, describing an engine working at the Govan Colliery, near Glasgow, where an ordinary engine was not applicable; and although, under other circumstances, not an economical mode of employing power, it has proved in the present case highly satisfactory, and has worked successfully for the past six years. The main shaft is sunk 176 yards, through six successive seams of coal, the first of which is 92 yards from surface at that point, and, after working the coal at that part, a main road was driven horizontally to a distance of 706 yards, and a second shaft, at present 26 yards deep, was then sunk near the extremity of the said main road for the purpose of working the third seam or rough main coal. The difficulty then arose of providing for the winding and pumping of this second shaft, at a distance of nearly half-a-mile from the first shaft. A steam boiler was inadmissable in that situation, and the distance was too great to convey steam from the surface. Some application of water-power was contemplated; but it was afterwards proposed to use compressed air supplied by a steam-engine at surface, and conveyed down a pipe to work an engine at the top of the second shaft, in the manner of a non-condensing steam-engine, the discharged air being thrown into the workings to aid in the ventilation of the mine. The steam cylinder is 15 in. diameter, and 3 ft. stroke, and drives 3 condensing air-pumps, which work alternately one on each side of the beam centre, delivering the air into a reservoir between them, from which it passes into the main pipe. The beam is connected at the other end to a crank and fly-wheel to equalise the motion. The air-pumps are 21 in. diameter, and 18 in. stroke. They are placed inverted, with the piston-rod passing out below where the stuffing-boxes are not exposed to the pressure of the compressed air, and are worked by cross-heads, sliding in vertical guides, by means of side rods from the beam. The air-pumps are fitted with ball-valves, of which there are three sets in each pump—each set consisting of 44 brass balls, 2 in. diameter, arranged in three concentric rings, the balls being confined by separate cages to a lift of ⅝ in. In consequence of the high pressure of the air (30 lbs. per square inch) provision is made for preventing leakage through the valves by a stratum of water constantly covering the piston-valves and the delivery and inlet valves through which all the air has to pass. A small pump, 3 in. diameter and 10 in. stroke, is employed to supply water for this purpose, and deliver it into the centre reservoir, from which it flows through small pipes into each of the air-pumps during the period of their downward strokes, the quantity of water admitted being regulated by a cock in each pipe. The surplus water is discharged at each upward stroke through the delivery-valves, and flows over the top into the centre reservoir, keeping the delivery-valves also covered with water; in this way the compressed air is entirely discharged, and there is no loss of power from expansion of air behind the piston at the beginning of the downward stroke. The level of water in the centre reservoir is regulated by means of a gauge-glass at the side. Any leakage of water past the piston-valves and piston escapes through the suction or inlet valves, and is carried off by a waste-pipe fitted to the casing of the air-pumps. The usual speed of this engine is about 25 revolutions per minute, with a pressure of 18 lbs. per square inch, giving a pressure of air averaging about 20 lbs. per square inch. The pressure of the air at the lower engine is only 1 lb. per square inch below the pressure at the compressing engine at the top of the pit. The absorption of heat on the sudden liberation of the compressed air from the lower engine at the discharge of each stroke causes so great a degree of cold, that in winter the engine is often stopped by the formation of ice in the cylinder and exhaust pipe.

PURIFICATION OF GAS.—Mr. G. L. Stott, St. George's, Gloucester, has provisionally specified improvements, which consist in purifying gas by causing it to pass over or amongst oxide of zinc, or the carbonate of the oxide, whereby the sulphur contained in the gas is caused to combine with the metallic zinc, forming a sulphide of that metal; and the oxide of zinc so produced may be reproduced by roasting the resulting sulphide in a current of air, or by other means known to metallurgists, so that the oxide of zinc reproduced can be used again.

* This suggestion would, we believe, be met by Dunn and Hattersley's retort boilers, frequently alluded to in the Journal.

† We recently published in the *Mining Journal* a description of the invention of Mr. Huntley, of Ruswarp near Whitby, which would entirely obviate this evil.

ELECTRO-PLATING, GILDING, AND BRASSING.

ORIGINAL RECIPES.

Professor Wood, of Springfield, Mass., a practical chemist, has communicated to the *Scientific American* useful recipes for the electro-metallurgist. He says, "I believe it is the first time that a solution for plating direct on iron, steel, or Britannia metal, has been published. In most of the experiments I have used Smees' battery; but for depositing brass, I prefer a battery fitted up as Groves', using artificial graphite—obtained from the inside of broken coal gas retorts—in the place of platinum. With one large cell (the zinc cylinder, being 8 × 3 inches, and excited with a mixture of 1 part sulphuric acid and 12 parts water, the graphite being excited with commercial nitric acid) I have plated six gross of polished iron buckles per hour with brass. I have also coated type and stereotype plates with brass, and find it more durable than copper-facing."

TO PREPARE CYANIDE OF SILVER.—1. Dissolve 1 oz. of pure silver in 2 ozs. of nitric acid and 2 ozs. of hot water, after which add 1 quart of hot water.—2. Dissolve 5 ozs. of the cyanide of potassium in 1 quart of water.

To the first preparation add by degrees a small portion of the second preparation, until the whole of the silver is precipitated, which may be known by stirring the mixture and allowing it to settle. Then drop into the clear liquid a very small quantity of the second preparation from the end of a glass rod; if the clear liquid is rendered turbid, it is a proof that the whole of the silver is not separated; if, on the other hand, the liquid is not altered, it is a proof that the silver is separated. The clear liquid; now to be poured off, and the precipitate—which is the cyanide of silver—washed at least four times in hot water. The precipitate may be now dried and bottled for use.

TO PREPARE CYANIDE OF GOLD.—Dissolve 1 oz. of fine gold in 1·4 oz. of nitric acid and 2 ozs. of muriatic acid; after it is dissolved, add 1 quart of hot water, and precipitate with the second preparation, proceeding the same as for the cyanide of silver.

TO PREPARE CYANIDES OF COPPER AND ZINC.—For copper, dissolve 1 oz. of sulphate of copper in 1 pint of hot water. For zinc, dissolve 1 oz. of the sulphate of zinc in 1 pint of hot water, and proceed the same as for cyanide of silver.

The electro-plater, to insure success in plating upon all metals and metallic alloys, must have two solutions of silver—the first to whiten or fix the silver to such metals as iron, steel, Britannia metal, and German silver; the second to finish the work, as any amount of silver can be deposited in a regeline state from the second solution.

FIRST, OR WHITENING SOLUTION.—Dissolve 2½ lbs. (troy) cyanide of potassium, 8 ozs. carbonate of soda, and 5 ozs. cyanide of silver, in 1 gallon of rain or distilled water. This solution should be used with a compound battery of three to ten pairs, according to the size of the work to be plated.

SECOND, OR FINISHING SOLUTION.—Dissolve 4½ ozs. (troy) of cyanide of potassium, and 1¼ oz. of cyanide of silver, in 1 gallon of rain or distilled water. This solution should be used with one large cell of Smee's battery, observing that the silver plate contains as near the surface of the articles to be plated as possible.

N.B. By using the first or whitening solution, you may insure the adhesion of silver to all kinds of brass, bronze, red cock metal, type metal, &c., without the use of mercury, which is so injurious to the human system.

TO PREPARE A SOLUTION OF GOLD.—Dissolve 4 ozs. troy of cyanide of potassium, and 1 oz. of cyanide of gold, in 1 gallon of rain or distilled water. This solution is to be used warm (about 90° Fahr.), with a battery of at least two cells.

TO PREPARE A SOLUTION OF COPPER OR ZINC.—Dissolve 8 ozs. (troy) cyanide of potassium, and 3 ozs. of cyanide of copper or zinc, in 1 gallon of rain or distilled water. These solutions to be used at about 160° Fahr., with a compound battery of from three to twelve cells.

TO PREPARE A SOLUTION OF BRASS.—Dissolve 1 lb. (troy) cyanide of potassium, 2 ozs. of cyanide of copper, and 1 oz. of cyanide of zinc, in 1 gallon of rain or distilled water; then add 2 ozs. of muriate of ammonia. This solution to be used at 160° Fahr. for smooth work, and from 90° to 120° for ornamental work, with a compound battery of from three to twelve cells.

Gold can be deposited of various shades, to suit the artist, by adding to the solution of gold a small quantity of the cyanides of silver, copper, or zinc, and a few drops of the hydro-sulphuret of ammonia.

ROTARY ENGINES.—An invention has been communicated to Mr. A. V. Newton, of Chancery-lane, and provisionally specified, but not proceeded with, which relates to a certain arrangement of a number of chambers formed around the interior of a hollow cylinder of metal or other unyielding material, by securing to the said cylinder a sheet or sheets of vulcanised india-rubber, or other flexible substance that is impervious to steam and other fluids under pressure, and a number of rollers, which, the said rollers being arranged within the cylinder, may be termed piston rollers, attached to a shaft placed concentrically to the cylinder, in such a manner as to press against the India-rubber or other flexible substance, and force it in contact with the cylinder, thereby closing the several chambers at their bearing points. By a proper arrangement of induction and eduction pipes, or passages communicating with the several steam chambers, steam or other fluid, or gas, under pressure, is admitted to the several chambers, to distend the india-rubber or other flexible substance behind the rollers, and press upon them, while the portions of the several chambers in front of the rollers are exhausted, and thus the rollers are acted upon like pistons, and caused to revolve within the cylinder, and produce a rotary movement of the shaft. The arrangement of chambers and rollers is such as to relieve the shaft of unequal pressure, and the power of the engine is in proportion to the number of steam chambers. The second part of the invention relates to the employment of conical-shaped clamping rings and chamfered-edged clamps, for securing the vulcanised india-rubber, or other flexible substance, of which the chambers are partly formed, to the cylinder, by which the cutting out or tearing of the material at the edge of its connection with the cylinder is to a great extent prevented. The third part of the invention relates to the protection of the vulcanised India-rubber, or other flexible impervious substance of which the chambers are partly formed, by means of an outward covering of wire gauze, or a woven fabric of wire, having the wires arranged obliquely to the axis of the cylinder, or by having a similar wire fabric incorporated into sheets of india-rubber, which arrangement gives the wire fabric the requisite flexibility; the wire fabric not only protecting the india-rubber or other impervious substance from injury by the rollers, but also serving to sustain it against the pressure of steam or fluid in the chambers. The fourth part of the invention relates to a certain contrivance for setting the piston rollers outwards or inwards, from or towards the central shaft, for the purpose of graduating their pressure upon the flexible portions of the chambers, or for drawing them out of contact with the said flexible portions of the chambers, when necessary for the repair of the engine. The piston rollers are carried by links, which are jointed to fixed and adjustable radial arms, connected to the central shaft of the engine. By slightly shifting the adjustable arms, the rollers may be moved outwards or inwards as may be required. The fifth part of the invention relates to a contrivance for admitting the steam or other elastic fluid to the chambers, severally, at the proper time to act upon the piston rollers, and cutting off the supply from each chamber when the wheels severally arrive at a given point on its surface, for the purpose of allowing the steam or other elastic fluid to act upon the wheels by its expansion alone during a certain portion of their revolution in contact with each chamber. A part of this contrivance serves also to reverse the engine. The steam chest contains three valves, formed of circular discs of metal, the innermost one and the outermost one being generally stationary, and the middle one rotating continuously with the shaft of the engine. The innermost valve, which is an eduction valve, and a cut-off, and also serves to effect the reversal of the direction of rotation of the engine, has two faces, of which the inner one fits up to a seat in the chest, and the outer one serves as a seat for the induction or middle valve. This valve is capable of being turned on its seat, to reverse the revolution of the engine, when desired. The outer valve has a number of passages through it, exactly corresponding in form and arrangement with the passages through the middle valve; this valve is used to vary the point of cutting off the steam to work expansively in the steam chambers. A yoke is attached to the middle valve, and serves to connect it with the outer valve, so that the former may be drawn away from the innermost valve to admit a full head of steam to the engine.

FURNACES OF LOCOMOTIVE BOILERS.—Mr. J. Juckes, Islington, provisionally specified some improvements in the fire-box or furnaces of locomotive boilers, which consist of so arranging the fire-box and fire-bars of a locomotive boiler, that an endless chain, or series of fire-bars, may be caused to move through such fire-box. For these purposes, in place of the back, front, and sides of the water spaces, surrounding the fire-box, descending to a similar extent, such water spaces at the front and back do not descend so low as the sides. Between the two sides an endless series or chain of fire-bars, such as before used by me in other forms of furnaces, is applied, and moved continuously or at intervals, so as progressively to pass into and out of the fire-box. The parts of the series or chain of fire-bars as they enter into the fire-box have the small coal thereon to such a depth as may be regulated by a suitable gauge. Above the parts of the fire-bars where they enter the fire-box, is formed an arch of brick, in order by its heat to assist in igniting the fuel as it enters into the fire-box. [A similar invention, by a Frenchman, was described many months since by our Paris Correspondent.]

FURNACES FOR THE MANUFACTURE OF CRUDE SODA.—Mr. P. Ellison, St. Helens, Lancashire, manufacturing chemist, has provisionally specified some improvements in furnaces, and the mode of working the same for the manufacture of black ash or crude soda, which consists firstly in constructing the furnace or furnaces so as to be enabled to work each charge of the materials on the same bed or bottom from beginning to end of the operation; and secondly, in arranging the furnace with its fireplace and ash-holes in such a manner that each charge of materials successively shall have the benefit of the full heat of the fires before the charge is withdrawn. It is proposed to build the furnace of brickwork, and of such a length or size as to contain many beds or bottoms, and an adequate number of fireplaces to decompose the charges, in order to produce black ash. By preference, each furnace should contain not less space than is equal to eight beds or bottoms; but more or less may be adopted if thought desirable. These eight beds have four fireplaces, one introduced between every two beds or bottoms, and the flues from the furnace to the chimney to be placed one at each end of the furnace, and each flue to be supplied with a damper, so that the draft of air through the furnace may be changed or reversed at pleasure to obtain the required heat for fluxing the materials. The ash-holes are each to have a door or damper, to prevent the admission of atmospheric air to the respective fireplaces, while the charge or charges of black ash material, which may be on certain beds, are being heated up and prepared for the process of fluxing. When this period arrives, the full force of the fire is to be directed on the particular bed containing the charge to be fluxed, by arranging the dampers in the flues, and opening the ash-pit door nearest to this charge. The furnace having been heated up in the usual ways with the fires, a charge of material for manufacturing black ash—namely, sulphate of soda, lime, and small coal, in their proper proportions (which are well known to alkali manufacturers, and, therefore, need not be particularised here), are placed on one of the beds of the furnace, and occasionally stirred with a rake or slicer, in order to expose all the parts to a proper heat. A fresh charge of black ash material is then to be placed on the next bed, and so on in succession, until all the beds contain a charge. When the time arrives for fluxing the mass into a ball or cake in any one bed, the fire nearest that charge is to be made to impinge on its surface, by reversing the draft of the furnace by means of the dampers. The fire being thus applied to the greatest advantage, the mass of material is then to be fluxed, by the assistance of the workman, with his rake and paddle, and withdrawn from the furnace into a box or mould for the reception of the black ash. A fresh charge of material is then let down from a hopper placed on the top of the furnace, one over each bed. The next bed in rotation with its charge which has been exposed to the general heat of the various fires is now to be subjected in like manner to the immediate influence of the nearest fire to effect the fluxing of that charge, and thus, by a succession of charges both in the flues of the furnace and in the admission or otherwise of atmospheric air to the ash-pits and fireplaces, by means of the dampers and doors, above referred to, the several advantages of economy of fuel and saving of labour are effected.

MANUFACTURE OF ORNAMENTAL METALLIC TUBES.—Mr. W. Bayliss, Birmingham, has patented an improved manufacture of ornamental metallic tubes, which consists of manufacturing ornamental metallic tubes by pressing a plain tube into contact with a mandril, the said mandril having upon it the ornamental figure to be given to the tube, the pressure being applied as hereafter described. The invention is applicable to the manufacture of taper tubes, having convex or concave flutes situated in the same planes as the axis of the tube, or passing spirally round the said tube. To carry the invention into effect, place a plain taper tube upon a twisted mandril; then place the said mandril and tube in a lathe, such as is used for cutting screws, and communicate to the said tube and mandril a rotatory motion. A tool is fixed in the slide rest of the lathe, and is carried from end to end of the tube during its rotation, the said tool moving as the cutting tool moves in a screw-cutting lathe. The end of the said tool is formed so as to fit the bottom of the twisted flute, whether the said flute be convex or concave. The said tool presses the tube into contact with the mandril in its interior, and communicates to the said tube the figure of the said mandril. The tube may be removed from the mandril by unscrewing it therefrom. When the flutes to be made in the tube are not twisted, then no rotatory motion is communicated to the mandril, but the tube placed upon the mandril is pressed into contact with the said mandril by a suitably shaped tool. The said tool is pressed upon the tube either by hand or by being placed in the slide rest of a lathe; or the tube and mandril may be fixed on the bed of a planing machine, and the pressing tool fixed in the place of the cutter in the planing machine. By carrying the tube and mandril under the tool as in working the ordinary planing machine, the tube may be pressed into contact with the mandril. The tube and mandril are made partially to rotate from time to time, so as to bring those portions of the tube which have not been previously acted upon under the operation of the pressing tool. The invention is applicable especially to the manufacture of taper tubes, as there is difficulty in removing the tube from the mandril if the mandril be of uniform diameter throughout. The tube, however, may be removed from a mandril of uniform diameter by heating the said tube suddenly, and thereby expanding the same.

LIQUID STONE.—In a recent Journal, we inserted a paragraph under this title from the *Scientific American*, and the inventor of the process has since corrected the statements therein set forth. His mode of dissolving quartz in water consists in the use of a calcining kiln, holding about 20 tons of quartz, with the fire only in each side at the front. The floor, grate, and trap-bridge are inclined at an angle of 30°, to facilitate the fall of the quartz into the cold tank, fed by a pipe leading the cold water down near the bottom, whilst the warm water is conducted off at the surface. The quartz thus rendered friable and somewhat porous is thrown into a scoop platform, of similar descent, into the pestle mill of circular construction, embracing all the facilities of crushing and sifting in a very rapid manner, with less than a 4-horse power to turn the shaft, which raises a dozen pestles, having a small pulley, with a succession of inclined planes to work upon. The shaft carries also around with it a shoveller, in form somewhat similar to a ploughshare, close to the stamping-floor, the latter being of solid timber, covered with a succession of iron bars, and against each other. The shaft also carries a metallic sieve with its knocker. From this mill the pulverised quartz finds its way by a continuous descent into the great boiler, being saturated on its passage thence with a small quantity of the cheapest solvents, rendered caustic by lime. By this means, the solution of 1 ton of quartz in 300 gallons of water is perfected in one hour. The solvent used is common salt, the chlorine being first set free in a process of treating gold-bearing pyrites, &c. The principle in this particular patent is the introduction of highly-heated steam through a hollow shaft to the bottom of the digester, while the escape steam, above a certain pressure, is rapidly condensed. A 15-horse power engine carries the shaft to five digesters or boilers, besides the pestle mill. In this way 25 tons of quartz are dissolved daily, making 7500 gallons of liquid stone, besides taking out all the gold.

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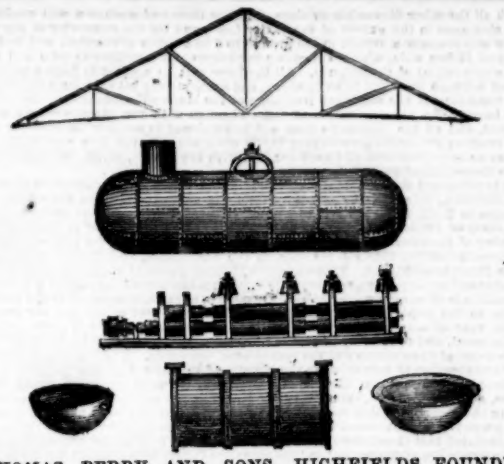

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